



Power Supply Efficiency Comparison at 380VDC versus 230VAC

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Antitrust Reminder (to be read at the beginning of all TGG meetings)

This is a reminder that all of ITI Green Grid activities are subject to strict compliance with the Green Grid's Antitrust Guidelines. Each individual participant and attendee at this meeting is responsible for knowing the contents of the Antitrust Guidelines, and for complying with the Antitrust Guidelines. Copies of the Antitrust Guidelines are available at:

<https://cw.thegreengrid.org/wg/TGG/document/18435?downloadRevision=active>

Acknowledgements

- 80 PLUS[®] Contributors
 - Tom Geist
 - Daniel Gagnon
 - Hayden Smith

Agenda

1. Purpose
2. Objective
3. Description
4. Follow-up Questions and Answers

Purpose and Objective

- Purpose
 - Determine if a testing criteria at 380VDC is warranted

- Objective
 - Measure the efficiency of power supplies at 380VDC and compare to the efficiency at 230VAC

Description

- Data gathered for 29 power supplies
- Testing completed over the past 3 years
- Power rating ranged from 350 W to 6300 W
- Multiple manufacturers

Questions and Answers

- Averages and Standard Deviation of Results
 - Sample size is too small to provide a statistically significant result
- Effect of boost running at 10%
 - Manufacturers would need to provide this information. It was not determined as part of testing.
- Was 380VDC testing conducted at the same bench as 230VAC testing?
 - Yes

Rated DC Voltage Range

Rated Input DC Voltage Range	Count	Percent
192-400	2	6.9%
200-380	1	3.4%
240-380	22	75.9%
260-400	4	13.8%

Rated Output DC Voltage

Rated DC Output Voltage Range	Count	Percent
12	12	41.4%
12.2	1	3.4%
12.3	5	17.2%
48-56	1	3.4%
53.5	1	3.4%
54	4	13.8%
54.5	1	3.4%
-54	3	10.3%
-56	1	3.4%

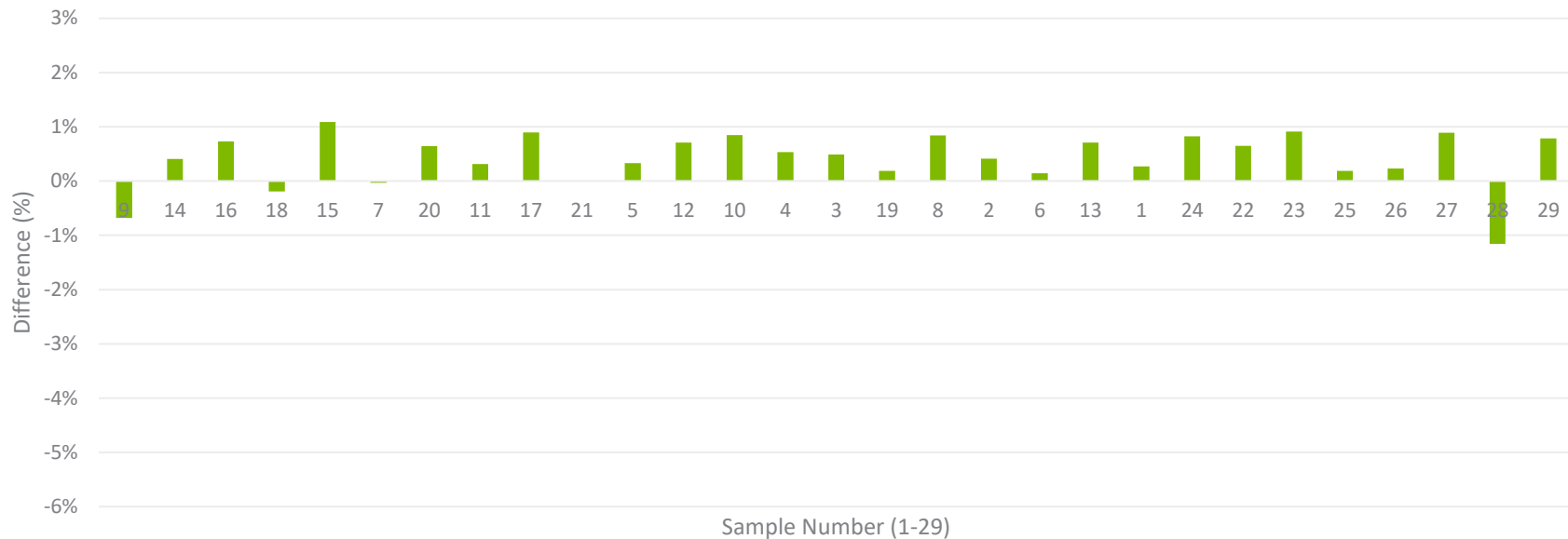
Form Factor

Form Factor	Count	Percent
CUSTOM	3	10.3%
1U	22	75.9%
EPS12V	1	3.4%
OTHER	3	10.3%

Questions and Answers

- Insufficient data to determine correlation between test date and efficiency change

Difference in Efficiency: 380VDC vs. 230VAC at 50% Load



Percent 380VDC Rated of All 230VAC Units Submitted

Study Year	All 230VAC Units Submitted	380VDC Rated	Percent
Year 1 (~2018)	157	11	7.0%
Year 2 (~2019)	112	10	8.9%
Year 3 (Q1 2020)	36	3	8.3%

Rated DC Voltages of All 230VAC Units Submitted

Rated DC Voltage	Count*
160-240 / 160-340	1
240	34
230-240	4
240-380	3
260-400	2
340	1

*Approximately 40% of the units noted are labeled as Rated VDC only for use in China

- Review includes all units tested between November 2019 and March 2020
- 42 units can operate at 240VDC (typically only in China)
 - Approximately 93% of units
- 5 units were tested at 380VDC
 - Approximately 11%

Testing Results

Power Supply Wattage Rating

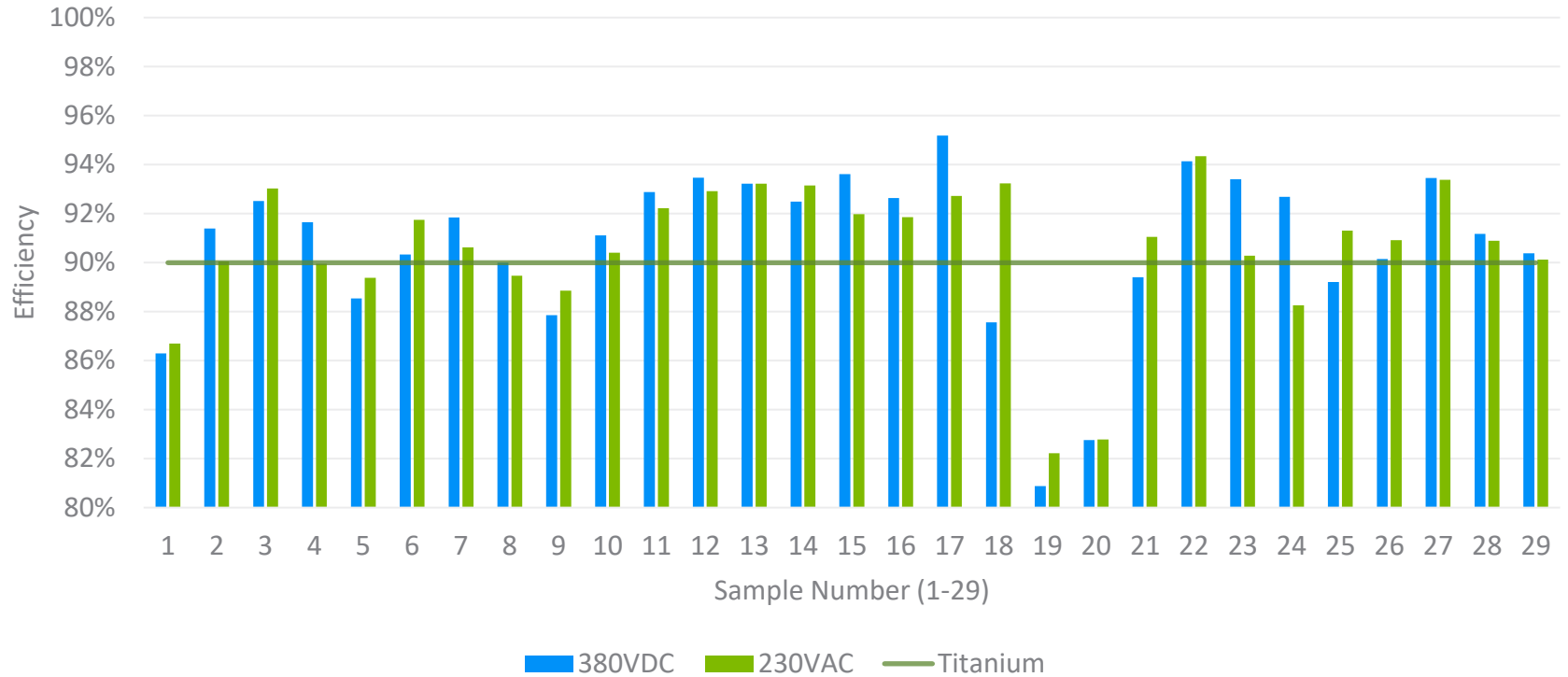
Sample Number	Wattage Rating
1	350
2	1100
3	1500
4	1500
5	1500
6	1500
7	1950
8	2000
9	2200
10	3000

Sample Number	Wattage Rating
11	3000
12	3000
13	3000
14	3000
15	3000
16	3000
17	3000
18	3200*
19	5500
20	6000

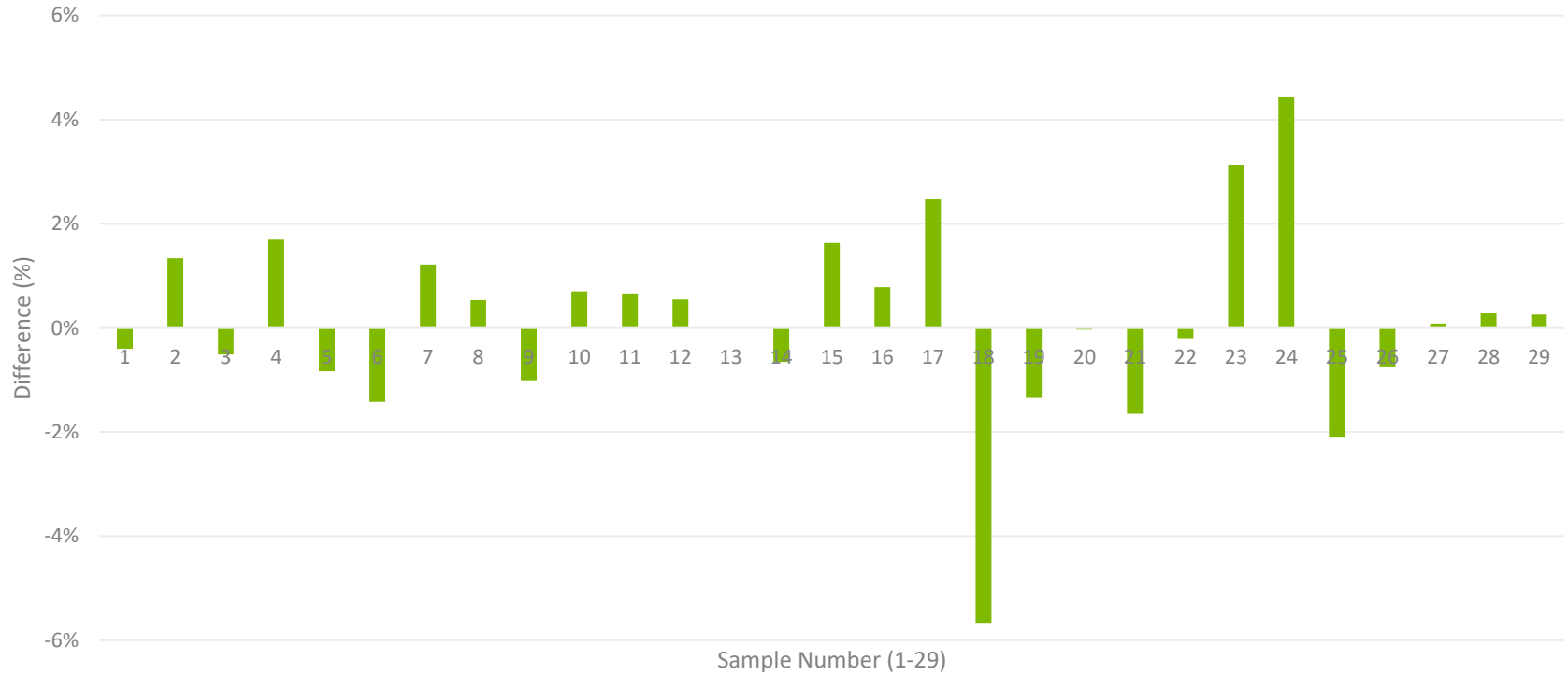
Sample Number	Wattage Rating
21	6000*
22	3200
23	2200
24	1500
25	850
26	850
27	3600
28	6300
29	3000
30	TBD

*Approximate

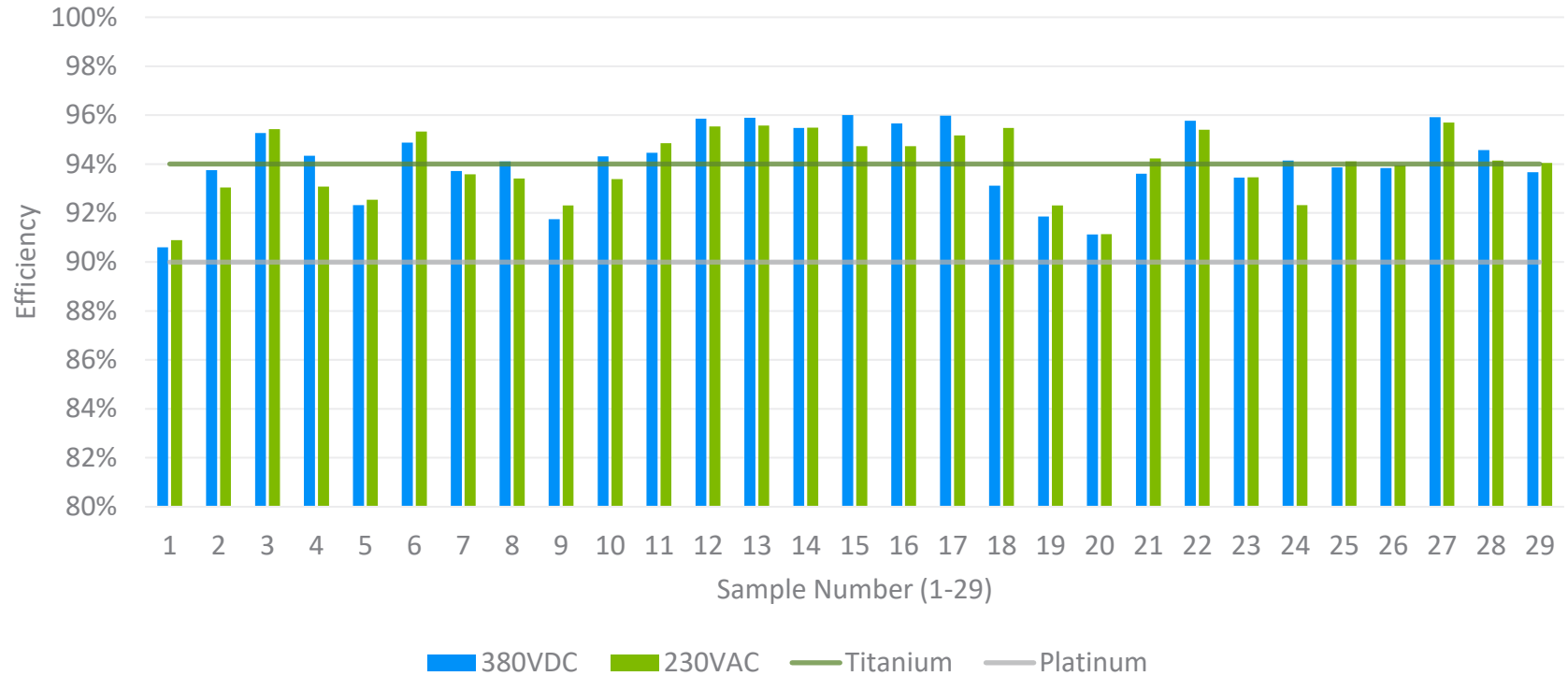
380VDC vs. 230VAC Efficiency at 10% Load



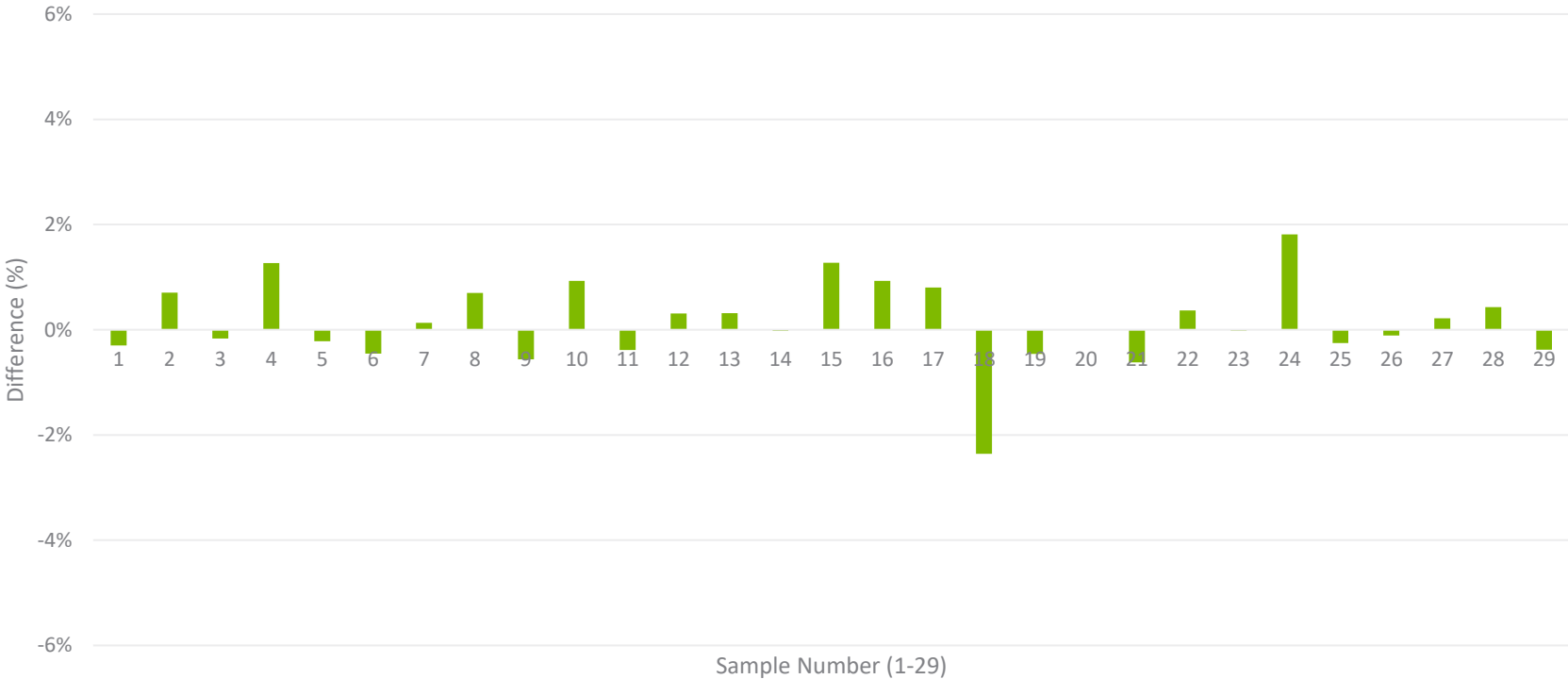
Difference in Efficiency: 380VDC vs. 230VAC at 10% Load



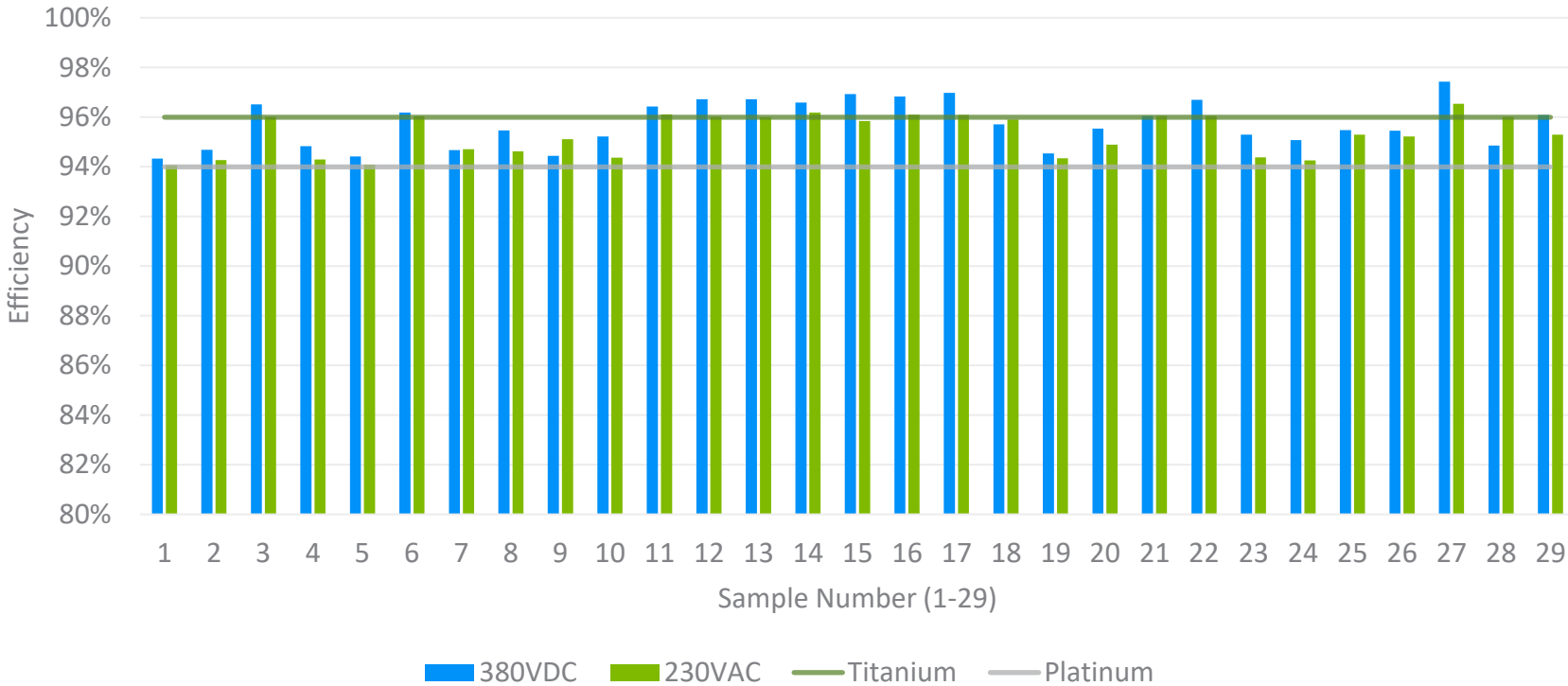
380VDC vs. 230VAC Efficiency at 20% Load



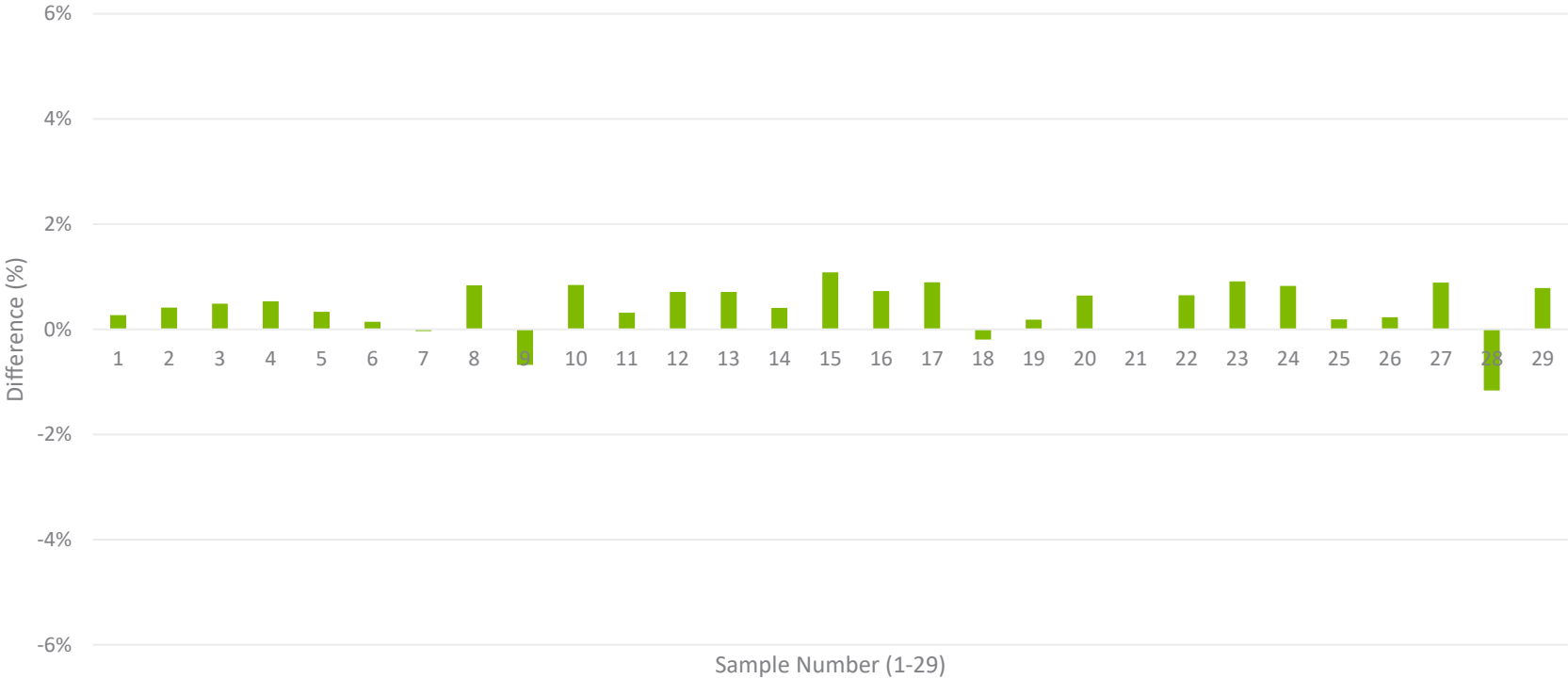
Difference in Efficiency: 380VDC vs. 230VAC at 20% Load



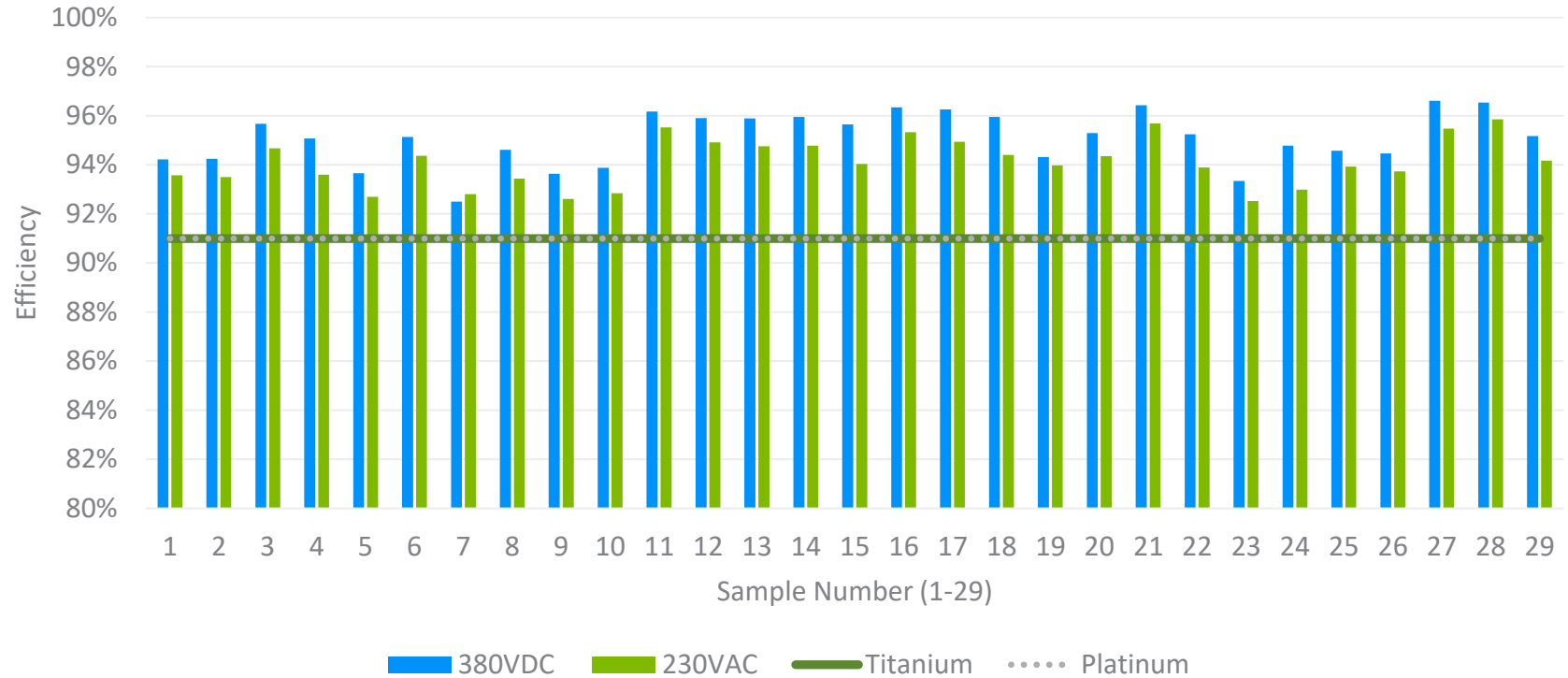
380VDC vs. 230VAC Efficiency at 50% Load



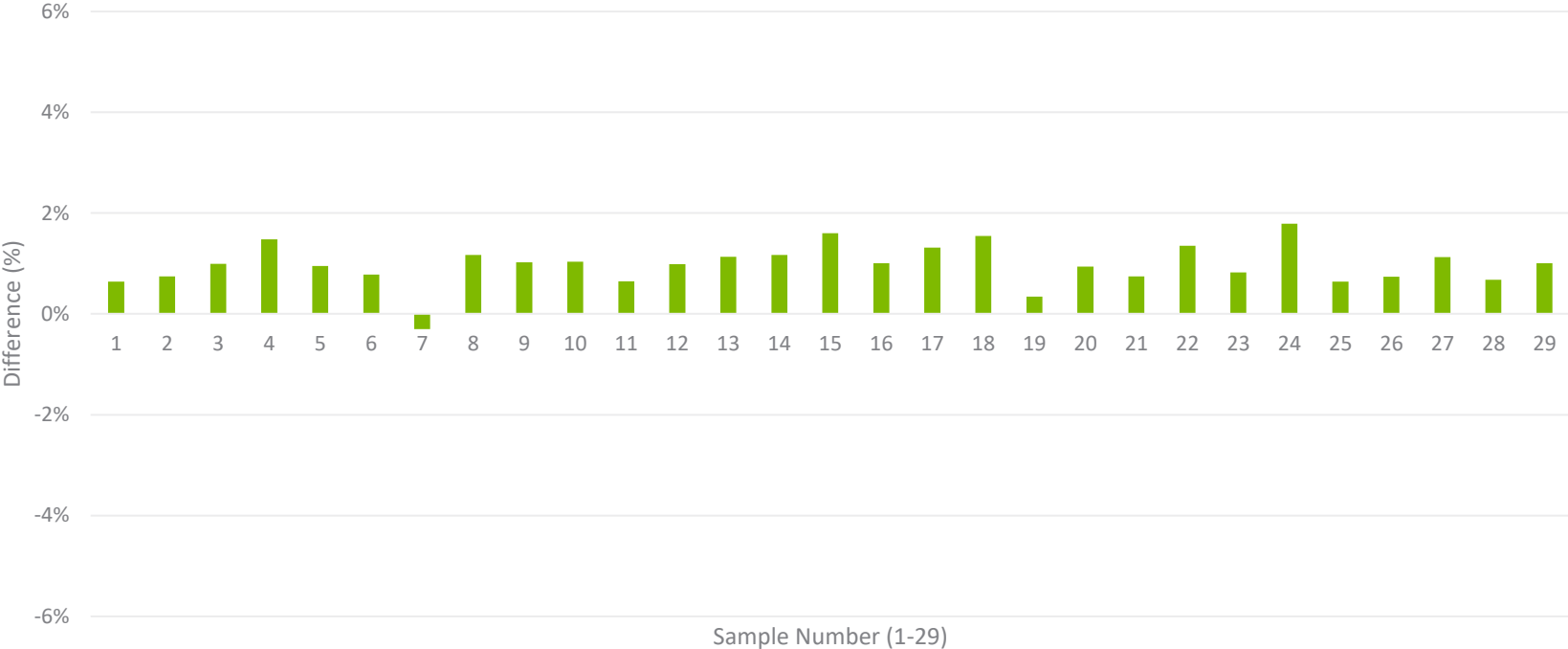
Difference in Efficiency: 380VDC vs. 230VAC at 50% Load



380VDC vs. 230VAC Efficiency at 100% Load



Difference in Efficiency: 380VDC vs. 230VAC at 100% Load





Thank you

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